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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/059,096
Filing Date: January 29, 2002
Appellant(s): WILCOCK ET AL.

Allan M. Lowe
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 04-28-2008 appealing from the Office action mailed 10-04-2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

Massie et al.	(US PAT. 5,943,427)	08-24-1999
Arnold et al.	(US PAT. 6,154,549)	11-28-2000

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

1. Claims 1-68 are rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 5943427 to Massie et al (hereafter as Massie) in view of USPN 6154549 to Arnold et al (hereafter as Arnold).

Regarding Claim 1, Massie discloses an audio user-interfacing method in which each of a plurality of items is represented in an audio field by plural synthesized sound sources from where sounds related to the item appear to emanate (Figs. 1B, 2-4, 9, 10 and 13), the method comprising the steps of:

(a) determining, for each said sound source, an associated rendering position at which the sound source is to be synthesized to emit sounds in the audio field (Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18), the rendering positions associated with the sound sources being on at least a portion of a three-dimensional audio space/environment (fig. 2, col. 4, lines 3-46);

(b) generating, using plural audio output devices, an audio field in which said sound sources are synthesized at their associated rendering positions to provide sounds related to the items concerned (Figs. 1B, 2-4, 9, 10 and 13; column 4, line 1 to column 5, lines 56), the audio out devices being actually or notionally located inside the three-dimensional audio space/environment (fig. 2, col. 4, lines 3-46).

Massie does not disclose the rendering positions associated with the sound sources is on at least a portion of cylindrical locus points. In other words, Massie does not disclose that the three-dimensional audio space/environment is defined in cylindrical coordinates. It is noted that Massie discloses that the three-dimensional audio

space/environment can be defined in spherical or rectangular coordinates. Col. 4, lines 35-37.

Arnold discloses an audio user-interfacing system/method, including a three-dimensional audio space/environment. In particular, Arnold discloses that, in addition to be defined in spherical and rectangular coordinates (figs. 17 and 15, respectively), the three-dimensional audio space/environment can also be defined in cylindrical coordinates (fig. 16). Col. 25, line 65 – col. 26, line 6; col. 10, lines 50-55.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to include into Massie cylindrical coordinates to define the three-dimensional audio space/environment of Massie. In so doing, the system of Massie would have provided the user with desired spatial environments having great realism or even surrealism in the production of sounds (Arnold, column 11, lines 41-54).

When the teachings of Massie and Arnold are combined, it would have been obvious that the rendering positions associated with the sound sources is on at least a portion of cylindrical locus points.

Regarding Claim 2, Massie as modified discloses displacing the audio field in a direction parallel to the longitudinal axis of said cylindrical locus of points whereby to change the portion of the field closest to a reference position where a user of the audio output devices is actually or notionally located (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Regarding Claim 3, Massie as modified discloses rotating the audio field about the longitudinal axis of said at cylindrical locus of points (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Regarding Claim 4, Massie as modified discloses the audio field is displaced in said direction in discrete steps of predetermined magnitude (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Regarding Claim 5, Massie as modified discloses the longitudinal axis of said at least cylindrical locus of points is vertically disposed, the sound sources being located at differing levels corresponding to floors of a building, the predetermined magnitude of said discrete steps corresponding to moving up or down one floor (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Regarding Claim 6, Massie as modified discloses the sound sources are arranged in groups with the sound sources in each group being at the same position along axis and the groups being separated one from another along said axis by distances corresponding to multiples, including one, of said predetermined magnitude (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Regarding Claim 7, Massie as modified does not expressly disclose sound sources located in the audio field outside of a focus zone fixed relative to said reference position, are at least partially muted relative to sound sources inside the focus zone; the

sound sources being un-muted and muted as the sound sources move into and out of the focus zone in response to displacement of the audio field in said direction parallel to the axis of the cylindrical locus of points.

Arnold discloses an inner range and an outer range between the user and the perceived location of a sound source. If a location is specified at which the sound source is to be perceived that is closer than the inner range, the sound may be produced according to the adjustment parameters corresponding to a location no closer than the inner range. If a location is specified at which the sound source is to be perceived that is farther than the outer range, the sound may be produced according to parameters corresponding to a location no farther than the outer range, the sound may be muted, or production of the sound may be avoided in order to provide great realism or even surrealism in the production of sounds. Arnold, column 31, line 65 to column 32, line 9.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify Massie as modified with the teaching of Arnold to provide that the sound sources located in the audio field outside of a focus zone fixed relative to said reference position, are at least partially muted relative to sound sources inside the focus zone; the sound sources being un-muted and muted as the sound sources move into and out of the focus zone in response to displacement of the audio field in said direction parallel to the axis of the cylindrical locus of points. In so doing, the system of Massie would have provided the user with desired spatial

environments having great realism or even surrealism in the production of sounds (Arnold, column 11, lines 41-54).

Regarding Claim 8, Massie as modified discloses sound sources adjacent to, but outside of, the focus zone are partially muted whilst those farther from the focus zone are fully muted (Arnold, Figs. 14-16; column 31, line 44 to column 32, line 9; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Regarding Claim 9, Massie as modified discloses sound sources outside of the focus zone are fully muted, an audio indication of the sound sources existing beyond the focus zone in at least one direction being un-muted in the audio field (Arnold, Figs. 14-16; column 31, line 44 to column 32, line 9; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Regarding Claim 10, Massie as modified discloses the audio field is stabilized relative to one of: a user's head; a user's body; a vehicle in which the user is traveling; the world; this stabilization taking account of whether the audio output devices are world, vehicle, body or head mounted, and, as appropriate, rotation of the user's head or body, or of the vehicle, about an axis parallel to the longitudinal axis of the cylindrical locus of points (Arnold, Figs. 14-16; column 31, line 44 to column 32, line 9; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Regarding Claim 11, Massie as modified discloses sound sources are synthesized to lie at different radial distances from the longitudinal axis of said cylindrical locus of points (Arnold, Figs. 14-16; column 31, line 44 to column 32, line 9;

Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18)).

Regarding Claim 12, Massie as modified discloses the longitudinal axis of said cylindrical locus of points is vertically disposed (Arnold, Figs. 14-16; column 31, line 44 to column 32, line 9; Massie, Figs. 1 B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Regarding Claim 13, Massie as modified discloses the longitudinal axis of said cylindrical locus of points is horizontally disposed (Arnold, Figs. 14-16; column 31, line 44 to column 32, line 9; Massie, Figs. 1B, 2-4, 9, 10 and 13i column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Regarding Claim 14, Massie as modified discloses at least some of the said items represented by the sound sources are audio labels for services, the method further including selecting a service by selecting the corresponding audio-label sound source (Arnold, Figs. 14-16; column 31, line 44 to column 32, line 9; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line.1 to column 6, line 18).

Regarding Claim 15, Massie as modified discloses an audio user-interfacing method in which each of a plurality of items is represented in an audio field by plural synthesized sound sources from where sounds related to the item appear to emanate (see figs 1B, 2-4, 9-10), the method comprising the steps of:

(a) determining, for each said sound source, an associated rendering position at which the sound source is to be synthesized to sound in the audio field (Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18);

(b) generating, using audio output devices, an audio field in which said sound sources are synthesized at their associated rendering positions to provide sounds related to the items concerned (Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1 to column 5, line 56), the audio output devices being actually or notionally located closer to a user of the audio output devices than the positions of the plural synthesized sound sources (see fig.2 col. 4 lines 3-46);

(c) exploring the audio field by rotating it about a predetermined axis (see fig. 1-2 and col. 3 line 59 - col. 4 line 17).

Massie does not disclose (d) exploring the audio field by displacing it in a direction parallel to said axis; with steps (c) and (d) being effected in any order or together. In other words, Massie does not disclose that the three-dimensional audio space/environment is defined in cylindrical coordinates. It is noted that Massie discloses that the three-dimensional audio space/environment can be defined in spherical or rectangular coordinates. Col. 4, lines 35-37.

Arnold discloses an audio user-interfacing system/method, including a three-dimensional audio space/environment. In particular, Arnold discloses that, in addition to be defined in spherical and rectangular coordinates (figs. 17 and 15, respectively), the three-dimensional audio space/environment can also be defined in cylindrical coordinates (fig. 16). Col. 25, line 65 – col. 26, line 67.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to include into Massie cylindrical coordinates to define the three-dimensional audio space/environment of Massie. In so doing, the system of

Massie would have provided the user with desired spatial environments having great realism or even surrealism in the production of sounds (Arnold, column 11, lines 41-54).

When the teachings of Massie and Arnold are combined, it would have been obvious include a step (d) exploring the audio field by displacing it in a direction parallel to the axis, and with steps (c) and (d) being effected in any order or together. This is because that both Massie and Arnold teach implementing their audio user-interfacing systems/methods in interactive applications such as video games, virtual reality systems and multimedia computer systems (Massie, col. 3, lines 49-54; Arnold, col. 11, lines 1-19). A typical purpose of an interactive application is to communicate with a user in an intuitive manner, such as displaying some important information to the user. The audio field simulation data of Massie/Arnold, such as the audio field at various locations after the rotation about a predetermined axis, is of great importance to the simulation. Therefore, it would have been obvious to displace it in a direction parallel to the axis (various locations). Further, rotating and displaying form major parts of one typical iteration of a simulation (ie, changing simulation parameters - calculating - displaying results), and simulations are typically performed with many iterations to achieve desired outcome. Therefore, it would have been obvious that the steps of 'c' and 'd' are effected in any order or together (ie, simulation iterations) to achieve desired outcome. Furthermore, appellant, in the paragraph bridging pages 6 and 7 of the Brief, cited the support for the step of displaying as page 5, lines 16-18; page 6, line 31- page 7, line 2; page 17, lines 18-20; and page 10, lines 15-18 of the specification. As disclosed, displaying is further described as outputting the audio field to the headphones. This is

clearly the case in Massie and Arnold (eg., Massie, fig. 1A; Arnold, fig. 28). Massie as modified by Arnold thus meets step d as claimed and as disclosed.

Claim 16 is essentially similar to Claim 4 and is rejected for the reasons stated above apropos to Claim 4.

Claim 17 is essentially similar to Claim 5 and is rejected for the reasons stated above apropos to Claim 5.

Claim 18 is essentially similar to Claim 6 and is rejected for the reasons stated above apropos to Claim 6.

Regarding 19, Massie as modified does not expressly disclose sound sources located in the audio field outside of a focus zone fixed relative to a notional user position, are at least partially muted relative to sound sources inside the focus zone; the sound sources being un-muted and muted as the sound sources move into and out of the focus zone in response to displacement of the audio field in said direction parallel to the longitudinal axis of at least a portion of a cylindrical locus of points.

Arnold discloses an inner range and an outer range between the user and the perceived location of a sound source. If a location is specified at which the sound source is to be perceived that is closer than the inner range, the sound may be produced according to the adjustment parameters corresponding to a location no closer than the inner range. If a location is specified at which the sound source is to be perceived that is farther than the outer range, the sound may be produced according to parameters corresponding to a location no farther than the outer range, the sound may be muted, or production of the sound may be avoided in order to provide great realism

or even surrealism in the production of sounds. Arnold, column 31, line 65 to column 32, line 9.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify Massie as modified with the teaching of Arnold to provide that sound sources located in the audio field outside of a focus zone fixed relative to a notional user position, are at least partially muted relative to sound sources inside the focus zone; the sound sources being un-muted and muted as the sound sources move into and out of the focus zone in response to displacement of the audio field in said direction parallel to the longitudinal axis of at least a portion of a cylindrical locus of points. In so doing, the system of Massie would have provided the user with desired spatial environments having great realism or even surrealism in the production of sounds (Arnold, column 11, lines 41-54).

Claim 20 is essentially similar to Claim 8 and is rejected for the reasons stated above apropos to Claim 8.

Regarding Claim 21, Massie as modified discloses sound sources outside of the focus zone are fully muted, an audio indication of the sound sources existing beyond the focus zone in at least one direction along said axis being un-muted in the audio field (Arnold, Figs. 14-16; column 31, line 44 to column 32, line 9; Massie, Figs. 1B, 2-4, 9-10, and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Claim 22 is essentially similar to Claim 10 and is rejected for the reasons stated above apropos to Claim 10.

Regarding Claim 23, Massie as modified discloses the sound sources are distributed over at least a portion of a cylindrical locus of points (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Regarding Claim 24, Massie as modified discloses the sound sources are distributed in three dimensions in terms of a cylindrical coordinate system referenced to said axis (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52 column 5, line 1 to column 6, line 18).

Regarding Claim 25, Massie as modified discloses said axis is vertically dispose€ (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Regarding Claim 26, Massie as modified discloses said axis is horizontally disposed (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52 column 5, line 1 to column 6, line 18).

Claim 27 is essentially similar to Claim 14 and is rejected for the reasons stated above apropos to Claim 14.

Claim 28 is essentially similar to Claim 1 and is rejected for the reasons stated above apropos to Claim 1 (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Regarding Claim 29, Massie as modified discloses the processor arrangement is arranged for: (a) setting the location of each said sound source relative to an audio-field reference (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-

52; column 5, line 1 to column 6, line 18); (b) controlling an offset between the audio-field reference and a presentation reference determined by the location of the audio output devices (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18), the processor arrangement including a user input arrangement and being operative to enable a user to set a displacement of the audio field relative to the presentation reference in a direction parallel to the longitudinal axis of said cylindrical locus of points (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18); and (c) deriving the rendering position of each sound source based on the location of the sound source in the audio field and said offset (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Regarding Claim 30, Massie as modified discloses the processor arrangement is further operative to enable a user to set a rotation of the audio field about the longitudinal axis of said cylindrical locus of points (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Regarding Claim 31, Massie as modified discloses the processor arrangement is arranged to permit the audio field to be displaced in said direction only in discrete steps of predetermined magnitude (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Claim 32 is essentially similar to Claim 7 and is rejected for the reasons stated above apropos to Claim 7.

Claim 33 is essentially similar to Claim 8 and is rejected for the reasons stated above apropos to Claim 8.

Claim 34 is essentially similar to Claim 9 and is rejected for the reasons stated above apropos to Claim 9.

Regarding Claim 35, Massie as modified discloses at least some of the said items represented by the sound sources are audio labels for services, the apparatus including a selection arrangement for selecting a service by selecting the corresponding audio-label sound source (Arnold, Figs. 14-16; Massie, Figs. 1BI 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Regarding Claim 36, Massie as modified discloses the processor arrangement is arranged for varying the said offset such as to stabilize the audio field reference relative to one of: a user's head; a user's body; a vehicle mounting the apparatus; the world (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Regarding Claim 37, Massie discloses apparatus for providing an audio user interface in which each of a plurality of items is represented in an audio field by plural respective synthesized sound sources from where sounds related to the item appear to emanate, the apparatus comprising: audio output devices, the audio output devices being actually or notionally located closer to a user of the audio output devices than the positions of the plural synthesized sound sources(see figs 1B, 2-4, 9-10); a processor arrangement for:

(a) determining, for each said sound source, an associated rendering position at which the sound source is to be synthesized to sound in the audio field (Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18);

(b) setting the location of each said sound source relative to an audio-field reference (see figs.2-4 col. 4 lines 3-46);

(c) controlling an offset between the audio-field reference and a presentation reference determined by the location of the audio output devices; the processor arrangement including a user input arrangement and being operative to enable a user to (see figs.2-6, 9-10 and col. 7 line 28-59):

set a rotation of the audio field about a predetermined axis (see figs. 1-6 and col. 3 line 59-col. 4 line 17),

and the processor (see fig. 1B) arrangement being arranged for deriving the rendering position of each sound source based on the location of the sound source in the audio field and said offset; the audio output devices and the processor arrangement being arranged for generating an audio field in which said sound sources are synthesized at their associated rendering positions to provide sounds related to the items concerned (Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1 to column 5, line 56).

Massie does not disclose setting a displacement of the audio field relative to the presentation reference in a direction parallel to said axis. In other words, Massie does not disclose that the three-dimensional audio space/environment is defined in cylindrical coordinates. It is noted that Massie discloses that the three-dimensional audio

space/environment can be defined in spherical or rectangular coordinates. Col. 4, lines 35-37.

Arnold discloses an audio user-interfacing system/method, including a three-dimensional audio space/environment. In particular, Arnold discloses that, in addition to be defined in spherical and rectangular coordinates (figs. 17 and 15, respectively), the three-dimensional audio space/environment can also be defined in cylindrical coordinates (fig. 16). Col. 25, line 65 – col. 26, line 67.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to include into Massie cylindrical coordinates to define the three-dimensional audio space/environment of Massie. In so doing, the system of Massie would have provided the user with desired spatial environments having great realism or even surrealism in the production of sounds (Arnold, column 11, lines 41-54).

When the teachings of Massie and Arnold are combined, it would have been obvious that the processor arrangement is operative to enable a user to set a displacement of the audio field relative to the presentation reference in a direction parallel to said axis.

Regarding Claim 38, Massie as modified discloses the processor arrangement is such that the offset is arranged to permit the audio field to be displaced in said direction only in discrete steps of predetermined magnitude (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Claim 39 is essentially similar to Claim 7 and is rejected for the reasons stated above apropos to Claim 7.

Claim 40 is essentially similar to Claim 8 and is rejected for the reasons stated above apropos to Claim 8.

Claim 41 is essentially similar to Claim 9 and is rejected for the reasons stated above apropos to Claim 9.

Regarding Claim 42, Massie as modified discloses the processor arrangement is arranged so that the rendering-position determination is so as to cause said sound sources to be on an at least a portion of a cylindrical locus of points (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Regarding Claim 43, Massie as modified discloses the processor arrangement is arranged so that the rendering-position determination is so as to cause the sound sources to be distributed in three dimensions in terms of a cylindrical coordinate system referenced to said axis (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Regarding Claim 44, Massie as modified discloses at least some of the said items represented by the sound sources are audio labels for services, the apparatus including a selection arrangement for selecting a service by selecting the corresponding audio-label sound source (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Regarding Claim 45, Massie as modified discloses the processor arrangement is arranged for varying the said offset such as to stabilize the audio field reference relative to one of: a user's head; a user's body; a vehicle mounting the apparatus; the world

(Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Claim 46 is essentially similar to Claim 1 and is rejected for the reasons stated above apropos to Claim 1.

Claim 47 is essentially similar to Claims 28-29 and is rejected for the reasons stated above apropos to Claims 28-29.

Regarding Claim 48, Massie as modified discloses the control arrangement is further operative to enable a user to set a rotation of the audio field about the axis of said cylindrical locus of points (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Regarding Claim 49, Massie as modified discloses the control arrangement is arranged to permit the audio field to be displaced in said direction only in discrete steps of predetermined magnitude (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Claim 50 is essentially similar to Claim 7 and is rejected for the reasons stated above apropos to Claim 7.

Claim 51 is essentially similar to Claim 8 and is rejected for the reasons stated above apropos to Claim 8.

Claim 52 is essentially similar to Claim 9 and is rejected for the reasons stated above apropos to Claim 9.

Regarding Claim 53, Massie as modified discloses at least some of the said items represented by the sound sources are audio labels for services, the apparatus

including a selection arrangement for selecting a service by selecting the corresponding audio-label sound source (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Regarding Claim 54, Massie as modified discloses the control arrangement for controlling the offset is arranged for varying the offset such as to stabilize the audio field reference relative to one of: a user's head; a user's body; a vehicle mounting the apparatus; the world (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Regarding Claim 55, Massie discloses apparatus for providing an audio user interface, in which each of a plurality of items is represented in an audio field by plural respective synthesized sound sources from where sounds related to the item appear to emanate(see figs 1B, 2-4, 9-10), the apparatus comprising:

a rendering-position determining arrangement operative to determine, for each said sound source, an associated rendering position at which the sound source is to be synthesized to sound in the audio field, the rendering-position determining arrangement comprising (see fig.2, col. 4 lines 3-46):

a setting arrangement for setting the location of each said sound source relative to an audio field reference(Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18);

a control arrangement for controlling an offset between the audio-field reference and a presentation reference determined by the location of audio output devices, the

control arrangement including a user input device and being operative to enable a user (see figs.2-6, 9-10 and col. 7 line 28-59):

to set a rotation of the audio field about a predetermined axis(see figs. 1-6 and col. 3 line 59-col. 4 line 17), and

a deriving arrangement for deriving the rendering position of each sound source based on the location of the sound source in the audio field and said offset; and a rendering subsystem, including the audio output devices, operative to generate an audio field in which said sound sources are synthesized at their associated rendering positions to provide sounds related to the items concerned, the audio output devices being actually or notionally located closer to a user of the audio output devices than the positions of the plural synthesized sound sources (Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1 to column 5, line 56).

Massie does not disclose setting a displacement of the audio field relative to the presentation reference in a direction parallel to said axis. In other words, Massie does not disclose that the three-dimensional audio space/environment is defined in cylindrical coordinates. It is noted that Massie discloses that the three-dimensional audio space/environment can be defined in spherical or rectangular coordinates. Col. 4, lines 35-37.

Arnold discloses an audio user-interfacing system/method, including a three-dimensional audio space/environment. In particular, Arnold discloses that, in addition to be defined in spherical and rectangular coordinates (figs. 17 and 15, respectively), the three-dimensional audio space/environment can also be defined in cylindrical

coordinates (fig. 16). Col. 25, line 65 – col. 26, line 67.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to include into Massie cylindrical coordinates to define the three-dimensional audio space/environment of Massie. In so doing, the system of Massie would have provided the user with desired spatial environments having great realism or even surrealism in the production of sounds (Arnold, column 11, lines 41-54).

When the teachings of Massie and Arnold are combined, it would have been obvious that the processor arrangement is operative to enable a user to set a displacement of the audio field relative to the presentation reference in a direction parallel to said axis.

Regarding Claim 56, Massie as modified discloses the control arrangement is operative to permit the audio field to be displaced in said direction only in discrete steps of predetermined magnitude (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Claim 57 is essentially similar to Claim 7 and is rejected for the reasons stated above apropos to Claim 7.

Claim 58 is essentially similar to Claim 8 and is rejected for the reasons stated above apropos to Claim 8.

Claim 59 is essentially similar to Claim 9 and is rejected for the reasons stated above apropos to Claim 9.

Regarding Claim 60, Massie as modified discloses the rendering-position determining arrangement is operative to cause said sound sources to on at least a

portion of a cylindrical locus of points (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Regarding Claim 61, Massie as modified discloses the rendering-position determining arrangement is operative to cause the sound sources to be distributed in three dimensions in terms of a cylindrical coordinate system referenced to said axis (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Regarding Claim 62, Massie as modified discloses at least some of the said items represented by the sound sources are audio labels for services, the apparatus including a selection arrangement for selecting a service by selecting the corresponding audio-label sound source (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Regarding Claim 63, Massie as modified discloses the control arrangement is arranged for varying the said offset such as to stabilize the audio field reference relative to one of: a user's head; a user's body; a vehicle mounting the apparatus; the world (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18).

Regarding Claim 64, Massie as modified the audio output devices are stereo headphones on the head of a user (Arnold, Figs. 14-16; Massie, Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18)

Claim 65 is essentially similar to Claim 64 and is rejected for the reasons stated above apropos to Claim 64.

Regarding claim 66 Arnold teaches that the rendering position associated with each of the sound sources is on at least a portion of a cylindrical locus of points (Figs. 14-17, column 1, lines 25-33; column 11, lines 41-54 and column 25 line 30-column 27 line 25 and discussion above claims 1 and 15)

Claim 67 is essentially similar to Claim 66 and is rejected for the reasons stated above apropos to Claim 66.

Claim 68 is essentially similar to Claim 66 and is rejected for the reasons stated above apropos to Claim 66.

(10) Response to Argument

Appellant alleged that Arnold et al has no disclosure of rendering positions of synthesized sound sources being on at least a portion of a cylindrical locus of points (Brief, page 16, second paragraph).

The examiner's response is that it is the combination of Massie and Arnold, instead of Arnold alone, that meets the claimed limitation. As discussed in the rejection of claim 1, while Massie does not disclose the rendering positions associated with the sound sources is on at least a portion of cylindrical locus points, in other words, Massie does not disclose that the three-dimensional audio space/environment is defined in cylindrical coordinates, Massie indeed discloses that the three-dimensional audio space/environment can be defined in spherical or rectangular coordinates. See Massie, col. 4, lines 35-37.

Arnold, on the other hand, discloses an audio user-interfacing system/method, which includes a three-dimensional audio space/environment. In particular, Arnold discloses that, in addition to be defined in spherical and rectangular coordinates (figs. 17 and 15, respectively), the three-dimensional audio space/environment can also be defined in cylindrical coordinates (fig. 16). See Arnold, col. 25, line 65 – col. 26, line 67. The advantages include providing the user with desired spatial environments having great realism or even surrealism in the production of sounds (Arnold, column 11, lines 41-54).

It would be obvious to one of ordinary skill in the art at the time appellant's invention was made to include into Massie cylindrical coordinates to define the three-dimensional audio space/environment of Massie. In so doing, the system of Massie would provide the user with desired spatial environments having great realism or even surrealism in the production of sounds.

When the teachings of Massie and Arnold are combined, it would be obvious that the rendering positions associated with the sound sources is on at least a portion of cylindrical locus points.

Therefore, the combined teachings of Massie and Arnold, meets the argued limitation as recited in claims 1, 28 and 46.

Regarding the argued rejections of independent claims 15, 37 and 55 (Brief, page 16, 3rd paragraph), the rejections of claims 15, 37 and 55 are now individually explained above. Claims 15, 37 and 55 are similar to claim 1 with respect to the crust of the appellant's claimed subject matter.

Appellant further alleged that one of ordinary skill in the art would not have modified Massie et al as a result of Arnold et al because Arnold et al is not compatible with Massie et al (Brief, page 18, 3rd paragraph).

The examiner respectfully disagrees. Massie et al synthesizes the position of one or more sound sources, such as emitter 208 (Fig. 2) relative to user 202. The sound synthesized by emitter(s) 208 is supplied to user 202 either by loud speakers 14 and 16 (Fig. 1A), or through headphones (col. 4, line 61). The speakers or headphones are supplied with left and right channel outputs; col. 4, lines 59-61.

Massie et al creates the sound field. In a preferred embodiment, locations may be defined in either spherical or rectangular coordinates in the room (see fig. 2) for the speakers system, or headphones system is supplied with left and right channel outputs (col. 4, lines 59-61).

In the same field of endeavor, Arnold et al discloses at least four electrical-acoustic transducers 16 (i.e., loudspeakers) surround the area from which the synthesized sound source is to be derived. The volume of acoustic energy derived from each speaker is varied to control the apparent position of a synthesized sound source coupled to a user who is inside all of the speakers. Arnold disclose the entire spatial environment of Fig. 12 is surrounded by transducers (speakers) 16 so that one of the speakers is located close to each apex of the rectilinear area. The rectilinear area is divided into 9 rectangular regions from which a synthesized sound source can appear to emanate. In the three dimensional cylindrical system of Fig. 16, eight transducers, that is, speakers, 16 are located peripherally to regions having maximal radial and height

components. Transducers 16 are equally spaced angularly over the full range of possible angular components that can be obtained from the three-dimensional cylindrical coordinate system of Fig. 16 (column 26, lines 13-19). Transducers 16 can also be located with similar Spacing peripheral to similar locations having a minimal height component for the spatial environment illustrated in Fig. 16. While Arnold et al. states that the three dimensional cylindrical coordinate system of Fig. 16 can include other numbers of transducers 16 and that transducers 16 can be located at different positions with respect to the environment of Fig. 16, it is apparent that the system of Fig. 16 must has transducers to provide simulated sound sources throughout the height and at any angle of the cylindrical coordinate system. In particular, to obtain attenuation to synthesize different regions within the cylindrical coordinate system of Fig. 16, in the radial, angular and height components.

Arnold et al discloses the co-existence of multiple coordinate systems, including, the cylindrical coordinate system of fig. 16, rectangular coordinate system of fig. 15 and spherical coordinate system of fig.17, for defining special locations of a sound field. Col. 25, line 65 – col. 26, line 67.

Therefore given the teaching of Arnold, one of ordinary skill in the art would be motivated to include into Massie the alternative cylindrical coordinates to define the three-dimensional audio space/environment. When the teachings of Massie and Arnold are combined, it would be obvious that the rendering positions associated with the sound sources is on at least a portion of cylindrical locus points, since a cylindrical locus

point is part of the coordinates/parameters defining a special location in cylindrical coordinates.

Further, appellant here is alleging that Arnold cannot be physically incorporated into Massie (incompatibility). The test for obviousness is not whether the features of one reference may be bodily incorporated into the other reference to produce the claimed subject matter but simply what the reference make obvious to one of ordinary skill in the art. It is the teachings of Massie and Arnold, instead of the physical elements / environments, that are combined.

Appellant further alleged that the prior art does not teach Claim 2 which requires the audio field of claim 1 to be displaced in a direction parallel to the longitudinal axis of the cylindrical locus of points to change the portion of the field closest to a reference position where a user of the audio output devices is actually or notionally located.

The examiner's response is that the combination of Massie and Arnold teaches cylindrical locus points, as discussed regarding claim 1. Massie as modified discloses displacing the audio field in a direction parallel to the longitudinal axis of said cylindrical locus of points whereby to change the portion of the field closest to a reference position where a user of the audio output devices is actually or notionally located (Arnold, Fig. 16 in particular) (additionally Massie, Figs. 1B, 2- 4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18). The combination of Massie and Arnold meets the limitation as recited in claim 2.

Appellant further alleged that the reliance on Massie et al for the feature of claim 3 is incorrect because the Examiner has admitted Massie et al. fails to disclose a cylindrical locus of points (see Brief, page 24 2nd paragraph).

The examiner respectfully disagrees. As discussed above, it is the combination of Massie and Arnold that teaches cylindrical locus points and rotating the audio fields about a longitudinal axis. The combination of Massie and Arnold meets the limitation as recited in claim 3.

Appellant further alleged that the prior art does not meet Claims 4, 16, 31, 38, 49 and 56 (Brief, page 24, 3rd paragraph).

The examiner respectfully disagrees. Arnold et al discloses the audio field to be displaced in the direction of an axis in discrete steps of predetermined magnitude (Arnold, see figs. 14-16 and see col. 24 line 63-col. 25 line 30). The combination of Massie and Arnold meets the limitations as recited in claims 4, 16, 31, 38, 49 and 56.

Appellant further alleged that Claims 5 and 17 require the synthesized sound sources to be located at different levels corresponding to floors of a building, and further require the predetermined magnitude of the discrete steps to correspond to moving up or down one floor. (see argument, page 24 last paragraph).

The examiner's response is that Massie et al discloses synthesized sound sources, and Arnold et al discloses sound sources being located at differing levels corresponding to floors of a building, and displacing an audio field at discrete steps corresponding to moving up or down one floor (Arnold, see figs. 14-16 and see col. 24

line 63-col. 25 line 30). The combination meets the limitation as recited in claims 5 and 17.

Appellant alleged that the prior art does not teach Claims 6 and 18 which require the synthesized sound sources to be arranged in groups so that the sound sources in each group are at the same position along the axis and the groups are separated one from another along the axis by distances corresponding to multiples, including one, of the predetermined magnitude associated with displacing the audio field in the axis direction in discrete steps. (see argument, page 25 first paragraph).

The examiner respectfully disagrees. Massie et al discloses synthesized sound sources, and Arnold et al discloses sound sources to be arranged in groups so that the sound sources in each group are at the same position along the axis and the groups are separated one from another along the axis by distances corresponding to multiples, including one, of the predetermined magnitude associated with displacing the audio field in the axis direction in discrete steps (Arnold, see figs. 1, 14-16 and see col. 24 line 63-col. 25 line 30). The combination meets the limitation as recited in claims 6 and 18.

Appellant further alleged that Claims 9, 21, 34, 41, 52 and 59 require an audio indication of the synthesized sound sources that exist beyond a focus zone to be un-muted, in contrast to the sound sources that are outside of the focus zone that are fully muted. In other words, an audio signal is generated to indicate there are muted sound sources outside of a focus zone. Appellants are unable to find any disclosure in either of the references at the relied on places to disclose an audio indication of fully muted

synthesized sound sources that are outside of a focus zone (see argument, page 25, 2nd paragraph).

The examiner's response is as follows. Massie et al discloses synthesized sound sources, and Arnold et al discloses sound sources that exist beyond a focus zone to be un-muted, in contrast to the sound sources that are outside of the focus zone that are fully muted. In other words, an audio signal is generated to indicate there are muted sound sources outside of a focus zone (Arnold, see figs. 1, 14-16, 28 and see col. 24 line 63-col. 25 line 30, col. 31 line 1-col. 32 line36). The combination meets the limitation as recited in claims 9, 21, 34, 41, 52 and 59.

Appellant further alleged that claims 10 and 22 further require the stabilization to take account of whether the audio output devices re world, vehicle, body or head mounted and, as appropriate, rotation of the user's head or body, or of the vehicle, about an axis parallel to the longitudinal axis of the cylindrical locus of points. Because the relied on portions of Massie et al. and Arnold et al. fail to disclose stabilization, certainly, these additional requirements of claims 10 and 22 are not disclosed in these references.

The examiner disagrees. Arnold et al discloses the stabilization (reads on mute the sound) to take account of whether the audio output devices re world, vehicle, body or head mounted and, as appropriate, rotation of the user's head or body, or of the vehicle, about an axis parallel to the longitudinal axis of the cylindrical locus of points (Arnold, see figs. 1, 14-16, 28 and see col. 24 line 63-col. 25 line 30, col. 31 line 1-col.

32 line36). The combination of Massie and Arnold meets the limitation as recited in claims 10-22.

Appellant further alleged that Claims 29 and 47 are apparatus claims requiring a processor arrangement (claim 29) or a rendering-position determining arrangement (claim 47) for setting the location of each synthesized sound source relative to an audio-field reference, and controlling an offset between the audio-field reference and a presentation reference determined by the location of audio output devices. A user input arrangement enables a user to set a displacement of the audio field relative to the presentation reference in a direction parallel to the longitudinal axis of the cylindrical locus of point. The rendering position of each synthesized sound source is derived based on the location of the sound source in the audio field and the offset. However, the Office Action fails to provide any information in the references regarding the claimed (1) audio-field reference, (2) offset between the audio-field reference and a presentation reference, or (3) an input enabling a user to set a displacement of the audio field relative to the presentation reference in a direction parallel to the longitudinal axis of a cylindrical locus point, and appellants ape unable to find any disclosure in the relied on portions of the references to support the examiner's contention (see argument, page 26, last paragraph).

The examiner disagrees. Massie et al discloses (a) setting the location of each said sound source relative to an audio-field reference (Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18); and deriving the rendering position of each sound source based on the location of the sound source in the audio

field and said offset (Figs. 1B, 2-6, 9, 10 and 13; column 7, lines 28-59); and Arnold et al discloses (b) controlling an offset between the audio-field reference and a presentation reference determined by the location of the audio output devices (see figs 8-10 and col. 9 line 36-col. 22 line 45), the processor arrangement including a user input arrangement and being operative to enable a user to set a displacement of the audio field relative to the presentation reference in a direction parallel to the longitudinal axis of said cylindrical locus of points (Arnold, Figs. 14-16; column 31, line 44 to column 32, line 9). The combination meets the limitations as recited in claims 29 and 47.

Appellant further alleged that claims 30 and 48, respectively dependent on claims 29 and 47, require the apparatus to be operative to enable a user to set a rotation of the audio field about the longitudinal axis of a cylindrical locus of points. Because neither reference discloses a cylindrical locus of points, as discussed supra, claims 30 and 48 are improperly rejected on the usual portions of Massie et alo and Arnold et al relied on by the examiner (see argument, page 27, 2nd paragraph).

The examiner disagrees. Massie et al discloses the apparatus to be operative to enable a user to set a rotation of the audio field about the longitudinal axis (Figs. 1B, 2-4, 9, 10 and 13; column 4, lines 1-52; column 5, line 1 to column 6, line 18); and Arnold et al discloses a cylindrical locus of points (Arnold, Figs. 14-16; column 31, line 44 to column 32, line 9). The combination meets the limitation as recited in claims 30 and 48.

Appellant further alleged that Claims 62 and 63 specifically require the audio output to be headphones. While Massie et al. discloses headphones, the combination of Arnold et al. and Massie et al is incompatible with a set of headphones because the

Arnold et al. device, in order to achieve spatial simulation of synthesized sound sources in a cylindrical coordinate system, requires more than two electric to audio transducers, i.e., loud speakers (see argument, page 27, last paragraph).

The examiner disagrees. Massie et al discloses the apparatus of the speaker system for spherical or rectangular coordinates (see figs 1-2 and col. 3 line 49-col. 4 line 37) and Arnold et al teaches speakers sound system defined in the cylindrical coordinate system of Fig. 16, Room/rectangular coordinate system of fig. 15 and spherical coordinate system of fig.17 for creating and describing a sound field. As discussed above, one of ordinary skill in the art would be motivated to modify Massie et al as a result of Arnold et al, which meets the limitations as recited in claims 62-63.

For the above reasons, it is believed that the rejections should be sustained.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

Respectfully submitted,

Lun-See Lao

/LUN-SEE LAO/

Examiner, Art Unit 2615

Examiner

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07-10-2008

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